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depends on nutrition, a poor food supply causing but slight enlargement of the part, whereas a good food supply causes considerable enlargement. The vegetative point, on the other hand, is unrelated to nutrition, so far as its symmetry is concerned. Contrary to most previous investigators, BOSHART finds no evidence that gravity or light influences leaf symmetry. It is believed rather that both anisophylly and leaf asymmetry are merely an expression of the symmetry of the plant as a whole. For example, anisophylly, and in most instances asymmetry also, is associated with dorsiventrality, radial shoots being characterized commonly by isophylly and symmetry. It seems very doubtful if this radical view, giving little or no place to the operation of external factors, will displace the many experimental contributions of past years. Even in this contribution it is admitted that good nutrition can result in the development of the vegetative point of a dorsiventral shoot into a radial shoot. It would seem, then, according to BOSHART, that external factors determine what sort of a shoot develops, but that the type of leaf is tied up inexorably with a particular kind of shoot.—HENRY C. COVLES.

**Photometric leaves and shoots.**—WIESNER in continuing his already very extensive studies upon the light relations of plants returns to the consideration of the orientation of leaves in response to the direction of incident light. Fixed and variable positions<sup>12</sup> are distinguished and examples of the latter, which he regards as the more perfect response, are multiplied, the legumes furnishing the major portion. More exact studies are made of leaves only apparently related to light and termed pseudophotometric,<sup>13</sup> in contrast to those actually orienting themselves in response to incident light, and emphasis is laid upon the part played by epinasty and geotropism acting before and simultaneously with phototropism. Most photometric leaves are found to be pseudophotometric in the earlier stages of their development.

Relations similar to those existing in leaves are shown to obtain for shoots.<sup>14</sup> All shoots with photometric leaves are shown to be themselves photometric, but the category also includes the shoots of such conifers as *Abies* and *Tsuga*, with leaves showing very slight responses to light. The effect of light of different intensities is to be seen in the shoots of *Taxus baccata*, being perpendicular, that is showing euphotometry, while with more intense light they become panphotometric. Some interesting cases of the photometry of anisophyllous shoots are also discussed.—GEO. D. FULLER.

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<sup>12</sup> WIESNER, J. v., Über fixe und variable Lichtlage der Blätter. Ber. Deutsch. Bot. Gesells. **29**:304-307. 1911.

<sup>13</sup> WIESNER, J. v., Über aphotometrische, photometrische, und pseudophotometrische Blätter. Ber. Deutsch. Bot. Gesells. **29**:355-361. 1911.

<sup>14</sup> WIESNER, J. v., Über die Photometrie von Laubsprossen und Laubsprosssystemen. Flora **105**:127-143. 1913.